AMENDMENT TO THE CLAIMS

1. (currently amended) A revivification display method specialized for component-composed characters of outline fonts that based on stroke centerline technology, characterized in that:

A) a stroke library based on the stroke centerline description

each stroke is divided into several stroke segments of different attributes according to its shapes, which are the head, body, corner and tail, the body and the corner can be several segments; in the stroke coordinate system, firstly the segments of stroke centerline are described by the coordinates of feature points on lines or Bezier curves, then the control points of each segment are the key points of stroke centerline; the outline curve is described then by the position relative to the reference of control points of each segment; the feature points are the start and end points of lines, but for the second-order Bezier, they are the start point, outer points of middle curve and the end point; the stroke data aren't equal to each other; the end of the stroke is signed by data bit of the tail;

the reference stroke library includes: the amount of strokes contained in the font, which takes 2 bytes; the head data of strokes, which takes amount of stroke*4 bytes, each stroke takes 4 bytes, where the first three bytes are the pointer of stroke data position, and the last byte consists of curvature change mode (4 bits) of the stroke and the number of segment (4 bits); and every stoke data, which include data of stroke centerline segments, outline data of stroke segments including only the coordinates of feature points of lines or Bezier curves in stroke coordinate system;

the amount of strokes for different fonts are different from each other, every different font has different stroke library;

B) a Chinese component library composed by strokes, itsthe data formats include:

suppose that the total number of strokes of the component contained in the component library is n, i.e. a component is consists of n strokes at most, usually n is 20-29, that is, a component includes 20-29 strokes; the components are ordered by 2-stroke components, 3-

stroke components, till n-stroke components;

the index table of n-stroke component: the largest number of strokes is supposed to be n; the position pointers of component data are ordered by 2-stroke component position, 3-stroke component position, till n-stroke component position; each 2-stroke component data takes 2*8 bytes, each 3-stroke component data takes 3*8 bytes, and so on;

component parameter data: the amount of stroke consisting the component; each stroke parameter data respectively are stroke number, thickness coefficients, stroke's position, scaling coefficients, curvature change increment, and the component parameter library of a certain font;

C) a Chinese font library consisted of Chinese component library, it includesing Chinese component library composed by strokes, the data formats include:

version information; the start position of character parameter field, the start position of component parameter field, and the start position of stroke data field;

character index data table: the total amount of characters; and then each 4 bytes denote the index of each character, where the first 3 bytes denote the position of character parameter data, and the last 1 byte is the amount of components;

each Chinese character parameter data are the parameters of each component, respectively component number, the amount of strokes contained in the component, component position, component scaling coefficients and component thickness coefficients;

the component can be used for other characters, and the stroke can be used for other components; the difference is the parameter data, each font has its own a character parameter library;

D) a compact share format of multi-font library, the number of one component of all fonts is the same, which needs to be described in only one font, while other font can share this part of data; the data format can be described as following:

the basic font format has been described in C), other font data format is: the amount of the component's strokes and component number in character parameter data can be omitted,

and the first stroke number in the component parameter data also can be omitted;

E) a stroke centerline technology and a procedure of displaying stroke graph at high resolution in the computer screen coordinate system,

the steps of data processing for the revivification of a parameterized stroke data of component-composed character and displaying the character on the computer screen are as following:

firstly, read the parameterized reference stroke data from parameterized stroke library, i.e. the data of drawing centerline segments and outline segments, these data are the coordinates relative to the stroke coordinate system;

because Chinese character's components consist of strokes, the second step is to transform coordinates of points on strokes from stroke coordinate system into component coordinate system, combine with component and call extern called parameters for data processing at the same time, these extern called parameters are stroke thickness, scaling coefficients, coordinates of stroke center in component coordinate system and curvature change parameter;

the Chinese character is composed of several components, each component has different size and position, the third step is to transform coordinates of composed strokes from component coordinate system into character coordinate system, combine with character and call extern called parameters of the strokes belonging to the component for data processing; these extern called parameters are component thickness, scaling coefficients, and coordinates of component center in character coordinate system;

every stroke of Chinese characters will be displayed on computer screen in the end, the fourth step is to transform coordinates of each point of composed strokes from character coordinate system into compute screen coordinate system, and combine with extern called parameters for data processing; these extern called parameters are character's length, width, scaling coefficients, coordinates of character center in screen coordinate system, foreground and background colors for character displaying, and memory array pointer of font's bitmap;

the formulas of transforming coordinates of each component' stroke from character coordinate system into device coordinate system are as following:

$$X_{kij} = ((X_{2i} + S_{xBi} \times X_{3j} \div 128) \times B_{xk} \div 128 + X_{k_1}) \times Z_{xs} \div 128 + X_0$$

$$Y_{kij} = ((Y_{2i} + S_{yBi} \times Y_{3j} \div 128) \times B_{yk} \div 128 + Y_{k_1}) \times Z_{ys} \div 128 + Y_0$$

where,

(X_{kij}, Y_{kij}) denotes coordinates of points on the ith stroke in character coordinate system;

(Z_{xs}, Z_{ys}) denotes scaling coefficients of the character;

(X_0, Y_0) denotes coordinates of character center in screen coordinate system;

(X_{3j}, Y_{3j}) denotes coordinates of the ith point in stroke coordinate system;

(X_{k1}, Y_{k1}) denotes coordinates of the kth component center in character coordinate system;

(B_{xk}, B_{yk}) denotes scaling coefficients of the kth component in X and Y directions;

(X_{2i}, Y_{2i}) denotes coordinates of the kth component's i^{th} stroke center in character coordinate system;

(S_{xBi}, S_{yBi}) denotes scaling coefficients of the kth component's i^{th} stroke in X and Y directions;

k=1 to the amount of components contained in the character;

i=1 to the amount of strokes contained in the kth component;

j=1 to the amount of points contained in the kth component's i^{th} stroke;

the fifth step is to display stroke on computer screen; through the data processing and coordinates transform, the coordinates of points on stroke centerline segment in screen coordinate system have been gained; firstly every segment of stroke centerline has been drawn; if~~in~~ case of the segment has curvature change, then curvature change increment will be added to the corresponding point; and then centerline segments are drawn with lines or Bezier curves according to segment signs; the drawing of lines or Bezier curves use known algorithms; after drawing all segments, the skeleton line of stroke centerline has been done; reference to the control points of centerline segments, combining with stroke thickness parameter and curvature

parameters of all segments, the coordinates of points of the first outline segments in screen coordinate system can be computed by clockwise from head to tail, and all segments of the first outline of the stroke can be drawn; then the segments of the second outline from tail to head are drawn; coordinates of each outline segment are relative to the corresponding control points of centerline; these relative coordinates multiply thickness coefficients, the extern called parameters, and plus coordinates of corresponding control points of centerline; the results are the coordinates of each outline segment in screen coordinate system; then outline segments are drawn with lines or Bezier curves according to each segment's signs and drawing mode; after these segments have been down, the outline of the stroke is completed; two outlines form a closed area, filling this area with known filling algorithms, a stroke of a Chinese character has been displayed;

F) a procedure of displaying a stroke-composed component is as following:

firstly, the numbers of a component's strokes and the parameters data are read from stroke-composed component file according to extern called parameters (including the amount of each component's strokes, component number, component position, component scaling coefficients and component thickness coefficients), the amount of a component's strokes and the component number; these parameters are stroke number, thickness coefficients, stroke position, stroke scaling coefficients and stroke curvature change increment; the coordinates of every stroke point are computed through coordinate transforming and data processing according to extern called parameters of components and parameters of every stroke, and every stroke is displayed; for all strokes of the component, repeat doing according to steps in E) till all the strokes are generated in the screen;

G) a procedure of displaying a component-composed Chinese character is as following:

firstly, get the extern called character code, extern called parameters in character revivification array, such as character thickness, character width, character length, character displaying color or grayscale and character display mode; font size of corresponding font can be got according to the character code index; the amount of components and parameters of each

component are read from component-composed font file according to the font size; the parameters of each component are the amount of a component's strokes, component number, coordinates of component center, component scaling coefficients and component thickness coefficients; every component is displayed after coordinates transforming and date process computing according to the extern called parameters and parameters of every component; for all components of the character, repeat doing according to steps in F) till all the components are generated on the screen.

2. (currently amended) A revivification display method specialized for stroke-composed characters of outline fonts that based on stroke centerline technology, characterized in that:

A) a stroke library based on the stroke centerline description, each stroke is divided into several stroke segments of different attributes according to its-shapes, which are the head, body, corner and tail, the body and the corner can be several segments; in the stroke coordinate system, firstly the segments of stroke centerline are described by the coordinates of feature points on lines or Bezier curves; then the control points of each segment are the key points of stroke centerline; the outline curve is described then by the position relative to the reference of control points of each segment; the feature points are the start and end points of lines, but for the second-order Bezier, they are the start point, outer points of middle curve and the end point; the stroke data aren't equal to each other; the end of the stroke is signed by data bit of the tail;

the reference stroke library includes: the amount of strokes contained in the font, which takes 2 bytes; the head data of strokes, which takes amount of stroke*4 bytes, each stroke takes 4 bytes, where the first three bytes are the pointer of stroke data position, and the last byte consists of curvature change mode (4 bits) of the stroke and the number of segment (4 bits); and every stoke data, which include data of stroke centerline segments, outline data of stroke segments including only the coordinates of feature points of lines or Bezier curves in stroke coordinate system;

the amount of strokes for different fonts are different from each other, every different font has

different stroke library;

B) a Chinese font library composed directly by strokes, itsthe data formats include:

the start position of stroke library relative to the head of font library; the total number of Chinese characters contained in the font library; the index table of Chinese characters, containing the pointer of each parameter data and the amount of the character's strokes; the parameter data of every Chinese character and the stroke library described in the A) of claim 1;

the parameter data of every Chinese character: the amount of the character's strokes; every stroke parameters data, including: stroke number, thickness coefficients, stroke position, stroke scaling coefficients and stroke curvature change increment; these are all parameters for generating font, while cannot represent the actual font; only extern called parameters are called and transformed, font Chinese character can be displayed by the generator of stroke-composed characters;

C) a procedure of displaying stroke graph at high resolution in the compute screen coordinate system by using strokes described by a stroke centerline technology

the steps of data process for the revivification of a parameterized stroke data of component-composed character and displaying the character on the computer screen are as following:

firstly, read the parameterized reference stroke data from parameterized stroke library, i.e. the data of drawing centerline segments and outline segments, these data are the coordinates relative to the stroke coordinate system;

the Chinese character is composed of several strokes, each stroke has different size and position; the second step is to transform coordinates of strokes from stroke coordinate system into character coordinate system, combine with character and call extern called parameters of the strokes for data processing; these extern called parameters are stroke thickness, scaling coefficients, stroke centerline and curvature change increment;

every stroke of Chinese characters will be displayed on computer screen in the end; the third step is to transform coordinates of each point of composed strokes from character coordinate system into compute screen coordinate system, and combine with extern called parameters for

data processing, these extern called parameters are character's length, width, scaling coefficients, coordinates of character center in screen coordinate system, foreground and background colors for character displaying, and memory array pointer of font's bitmap;

the formulas of transforming coordinates of each character from character coordinate system into device coordinate system are as following:

$$X_{kij} = ((X_{2i} + S_{xBi} \times X_{3j} \div 128) \times B_{xk} \div 128 + X_{k_1}) \times Z_{xs} \div 128 + X_0$$

$$Y_{kij} = ((Y_{2i} + S_{yBi} \times Y_{3j} \div 128) \times B_{yk} \div 128 + Y_{k_1}) \times Z_{ys} \div 128 + Y_0$$

where,

$\left(X_{kij}, Y_{kij}\right)$ denotes coordinates of points on the ith stroke in character coordinate system;

$\left(Z_{xs}, Z_{ys}\right)$ denotes scaling coefficients of the character;

$\left(X_0, Y_0\right)$ denotes coordinates of character center in screen coordinate system;

$\left(X_{3j}, Y_{3j}\right)$ denotes coordinates of the ith point in stroke coordinate system;

$\left(X_{k1}, Y_{k1}\right)$ denotes coordinates of the kth component center in character coordinate system;

$\left(B_{xk}, B_{yk}\right)$ denotes scaling coefficients of the kth component in X and Y directions;

$\left(X_{2i}, Y_{2i}\right)$ denotes coordinates of the kth component's i[th] stroke center in character coordinate system;

$\left(S_{xBi}, S_{yBi}\right)$ denotes scaling coefficients of the kth component's i[th] stroke in X and Y directions;

wherein, k equals to 1, it means that the character is composed of a single component;

i=1 to the amount of strokes contained in the component;

j=1 to the amount of points contained in the component's i[th] stroke, that is, in the character's i[th] stroke;

the fourth step is to display stroke on computer screen; through the data process and coordinates transform, the coordinates of points on stroke centerline segment in screen coordinate system have been gained, firstly every segment of stroke centerline has been drawn, ifin case of the segment has curvature change, then curvature change increment will be added to

the corresponding point; and then centerline segments are drawn with lines or Bezier curves according to segment signs; the drawing of lines or Bezier curves use known algorithms; after drawing all segments, the skeleton line of stroke centerline has been done; reference to the control points of centerline segments, combining with stroke thickness parameter and curvature parameters of all segments, the coordinates of points of the first outline segments in screen coordinate system can be computed by clockwise from head to tail, and all segments of the first outline of the stroke can be drawn; then the segments of the second outline from tail to head are drawn; coordinates of each outline segment are relative to the corresponding control points of centerline; these relative coordinates multiply thickness coefficients, the extern called parameters, and plus coordinates of corresponding control points of centerline; the results are the coordinates of each outline segment in screen coordinate system; then outline segments are drawn with lines or Bezier curves according to each segment's signs and drawing mode; after these segments have been down, the outline of the stroke is completed; two outlines form a closed area; filling this area with known filling algorithms, a stroke of a Chinese character has been displayed;

D) a procedure of displaying a stroke-composed Chinese character is as following:

firstly, get the extern called character code, extern called parameters in character revivification array, such as character thickness, character width, character length, character displaying color or grayscale and character display mode; font size of corresponding font can be got according to the character code index; the amount of strokes composed the character and parameters of each stroke are read from stroke-composed font file according to the font and the font size, these parameters of each stroke are the stroke number, thickness coefficients, stroke position, stroke scaling coefficients and stroke curvature change increment; every stroke is displayed after coordinates transforming and date process computing according to the extern called parameters and parameters of every stroke; for all strokes of the character, repeat doing according to steps in C) till all the strokes are generated on the screen; then a Chinese character is completely displayed.